



10030996-030402

Rec'd PCT/PTO 4 MAR 2002

Our Reference: VWP-512-A

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Bruno Egner-Walter  
Serial Number: 10/030,896  
Filing Date: December 11, 2002  
Examiner/Art Group Unit: Unknown/Unknown  
Title: WIPER BLADE FOR CLEANING GLASS  
SURFACES ON VEHICLES, ESPECIALLY  
MOTOR VEHICLES

PRELIMINARY AMENDMENT

Assistant Commissioner of Patents  
Washington, D.C. 20231

Sir:

If any charges or fees must be paid in connection with the following communication, they may be paid out of our Deposit Account No. 25-0115.

Prior to initial examination, please amend the above-identified patent application as indicated below.

In the claims:

In the claims:

- 1 1. (Amended) [Wiper] A wiper blade for cleaning glass surfaces
- 2 on vehicles, specifically motor vehicles, having an elongated wiper blade body [(2)]
- 3 which consists of a flexible rubber material and can be laid against the particular
- 4 glass surface, furnished on both longitudinal sides with longitudinal grooves [(10)]
- 5 situated opposite each other, in which a preferably springy support spline [(3)]
- 6 extending in the longitudinal direction [L] of the wiper blade body [(2)] engages with
- 7 part of its width, where each support spline [(3)] protrudes beyond the longitudinal
- 8 side in question [(8, 9)] with a further part of its width, characterized in that a
- 9 profiled cover covering this support spline is mounted and attached to the protruding
- 10 part of at least one of the support splines [(3)].

1                   2.       (Amended) [Wiper] The wiper blade in accordance with claim  
2       1, wherein at least one profiled cover [(13)] is provided on a front side of the wiper  
3       blade [(1, 1a),] with respect to the direction of travel of a vehicle.

1                   3.       (Amended) [Wiper] The wiper blade in accordance with claim  
2       1[or 2], wherein a profiled cover [(13, 14, 14a)] is mounted [in each case] on the  
3       projecting parts of both support splines [(10)].

1                   4.       (Amended) [Wiper] The wiper blade in accordance with [one  
2       of the preceding claims] claim 4, wherein the profiled cover [(13, 14, 14a)] covers  
3       [the] projecting parts of each of the support splines [(3)] along its entire length.

1                   5.       (Amended) [Wiper] The wiper blade in accordance with [one  
2       of the preceding claims] claim 1, wherein at least one profiled cover [(13, 14, 14a)]  
3       fits closely against [the] an adjacent longitudinal side [(8, 9)] of the wiper blade body  
4       [(2)].

1                   6.       (Amended) [Wiper] The wiper blade in accordance with [one  
2       of the preceding claims] claim 1, wherein at least one profiled cover [(13)] is retained  
3       on the appropriate support spline [(3)] by catches [(17, 18)].

1                   7.       (Amended) [Wiper] The wiper blade in accordance with [one  
2       of the preceding claims] claim 1, wherein the at least one profiled cover [(13, 14,  
3       14a)] has a longitudinal groove [(15, 16)] with which it is mounted on [the] a  
4       projecting part of at least one support spline [(3),] [gripping it like a claw].

1                   8.       (Amended) [Wiper] The wiper blade in accordance with claim  
2       7, wherein at least one projection [(17)] is provided in the longitudinal groove [(15,  
3       16),] which acts in conjunction with a mating notch [(18)] on the specific support  
4       spline [(3)].

1                   9.       (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein at least one passage [(22, 23)] extending in  
3 the longitudinal direction of the wiper blade [(L)] is provided in at least one profiled  
4 cover [(13, 14, 14a)] for a cleaning or washing fluid, and wherein at least one nozzle  
5 orifice [(24, 25)] opens into the passage [(22, 23)] to discharge the cleaning or  
6 washing fluid onto a glass surface.

1                   10.       (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 9, [wherein] characterized by at least one connection  
3 [(11)] to connect the passage [(22, 23)] to a source for [the] cleaning or washing  
4 fluid.

1                   11.       (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein at least one profiled cover [(13, 14a)] has  
3 one of a strip-like projection [(13')] [or] and a strip-like face [(14a')] which extends  
4 beyond the underside of the remaining part of the profiled cover [(13, 14a)].

1                   12.       (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein at least one profiled cover [(13), preferably  
3 the profiled cover (13) on the front side of the wiper blade (1, 1a) with respect to the  
4 direction of travel of a vehicle,] is configured as one of an airfoil on an outer surface  
5 extending in the longitudinal direction of the wiper blade [(L), or is furnished] and  
6 with a primary airfoil surface [(19)].

1                   13.       (Amended) [Wiper] The wiper blade in accordance with claim  
2 12, wherein at least one profiled cover [(13)] is equipped on its projection [(13')]  
3 with a primary airfoil surface [(19)].

1                   14.       (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein the wiper blade body [(2)] is configured on

-4-

3 one upper side as one of an airfoil [or] and [is equipped with a] first and second  
4 airfoil [surface] surfaces.

1 15. (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 14, wherein at least one profiled cover [(13)] has a  
3 surface [(21)] which adjoins the second airfoil surface and [thus] effectively increases  
4 the width of the second airfoil surface [(12)].

1 16. (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein at least one profiled cover [(13, 14, 14a)] is  
3 manufactured from plastic.

1 17. (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein at least one profiled cover [(13, 14, 14a)] is  
3 manufactured from a flexible material.

Add the following new claim:

1 18. (New) The wiper blade in accordance with claim 12 wherein at  
2 at least one profiled cover is the profiled cover, preferably the profiled cover on the  
3 front side of the wiper blade with respect to the direction of travel of a vehicle.

-5-

REMARKS

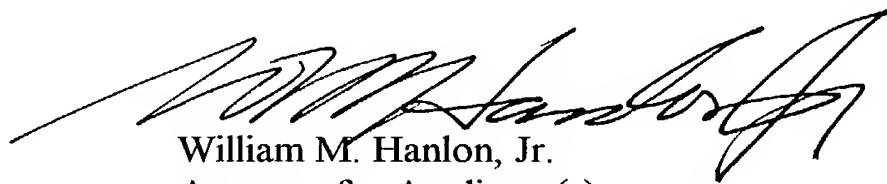
After entry of this amendment, claims 1-17 have been amended. New claim 18 has been added.

A handwritten, corrected copy of the specification is enclosed showing the changes which have been made to the specification as required by Section 608.01(Q) and 714.20(1) of the Manual of Patent Examining Procedure. The Substitute Specification filed herewith has been amended to utilize idiomatic English, correct minor typographical and grammatical errors and to conform the application to current United States patent practice. The Substitute Specification includes no new subject matter; but does include the same changes handwritten in red in the attached, corrected, original specification. Entry of the Substitute Specification is respectfully requested.

It is submitted that this Amendment has antecedent basis in the application as originally filed, including the specification, claims and drawings, and that this Amendment does not add any new subject matter to the application. Consideration of the application as amended is requested.

Respectfully submitted,

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& HELMHOLDT, P.C.



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Dated: February 20, 2002  
WMH/jas

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**In the claims:**

1                                    1.            (Amended) [Wiper] A wiper blade for cleaning glass surfaces  
2            on vehicles, specifically motor vehicles, having an elongated wiper blade body [(2)]  
3            which consists of a flexible rubber material and can be laid against the particular  
4            glass surface, furnished on both longitudinal sides with longitudinal grooves [(10)]  
5            situated opposite each other, in which a preferably springy support spline [(3)]  
6            extending in the longitudinal direction [L] of the wiper blade body [(2)] engages with  
7            part of its width, where each support spline [(3)] protrudes beyond the longitudinal  
8            side in question [(8, 9)] with a further part of its width, characterized in that a  
9            profiled cover covering this support spline is mounted and attached to the protruding  
10           part of at least one of the support splines [(3)].

1                    2.            (Amended) [Wiper] The wiper blade in accordance with claim  
2            1, wherein at least one profiled cover [(13)] is provided on a front side of the wiper  
3            blade [(1, 1a),] with respect to the direction of travel of a vehicle.

1                                3.            (Amended) [Wiper] The wiper blade in accordance with claim  
2            1[or 2], wherein a profiled cover [(13, 14, 14a)] is mounted [in each case] on the  
3            projecting parts of both support splines [(10)].

1                    4.            (Amended) [Wiper] The wiper blade in accordance with [one  
2            of the preceding claims] claim 4, wherein the profiled cover [(13, 14, 14a)] covers  
3            [the] projecting parts of each of the support splines [(3)] along its entire length.

1                    5.         (Amended) [Wiper] The wiper blade in accordance with [one  
2         of the preceding claims] claim 1, wherein at least one profiled cover [(13, 14, 14a)]  
3         fits closely against [the] an adjacent longitudinal side [(8, 9)] of the wiper blade body  
4         [(2)].

1                   6.       (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein at least one profiled cover [(13)] is retained  
3 on the appropriate support spline [(3)] by catches [(17, 18)].

1                   7.       (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein the at least one profiled cover [(13, 14,  
3 14a)] has a longitudinal groove [(15, 16)] with which it is mounted on [the] a  
4 projecting part of at least one support spline [(3),] [gripping it like a claw].

1                   8.       (Amended) [Wiper] The wiper blade in accordance with claim  
2 7, wherein at least one projection [(17)] is provided in the longitudinal groove [(15,  
3 16),] which acts in conjunction with a mating notch [(18)] on the specific support  
4 spline [(3)].

1                   9.       (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein at least one passage [(22, 23)] extending in  
3 the longitudinal direction of the wiper blade [(L)] is provided in at least one profiled  
4 cover [(13, 14, 14a)] for a cleaning or washing fluid, and wherein at least one nozzle  
5 orifice [(24, 25)] opens into the passage [(22, 23)] to discharge the cleaning or  
6 washing fluid onto a glass surface.

1                   10.      (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 9, [wherein] characterized by at least one connection  
3 [(11)] to connect the passage [(22, 23)] to a source for [the] cleaning or washing  
4 fluid.

1                   11.      (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein at least one profiled cover [(13, 14a)] has  
3 one of a strip-like projection [(13')] [or] and a strip-like face [(14a')] which extends  
4 beyond the underside of the remaining part of the profiled cover [(13, 14a)].

1                   12.     (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein at least one profiled cover [(13), preferably  
3 the profiled cover (13) on the front side of the wiper blade (1, 1a) with respect to the  
4 direction of travel of a vehicle,] is configured as one of an airfoil on an outer surface  
5 extending in the longitudinal direction of the wiper blade [(L), or is furnished] and  
6 with a primary airfoil surface [(19)].

1                   13.     (Amended) [Wiper] The wiper blade in accordance with claim  
2 12, wherein at least one profiled cover [(13)] is equipped on its projection [(13')]  
3 with a primary airfoil surface [(19)].

1                   14.     (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein the wiper blade body [(2)] is configured on  
3 one upper side as one of an airfoil [or] and [is equipped with a] first and second  
4 airfoil [surface] surfaces.

1                   15.     (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 14, wherein at least one profiled cover [(13)] has a  
3 surface [(21)] which adjoins the second airfoil surface and [thus] effectively increases  
4 the width of the second airfoil surface [(12)].

1                   16.     (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein at least one profiled cover [(13, 14, 14a)] is  
3 manufactured from plastic.

1                   17.     (Amended) [Wiper] The wiper blade in accordance with [one  
2 of the preceding claims] claim 1, wherein at least one profiled cover [(13, 14, 14a)] is  
3 manufactured from a flexible material.





Rec'd PCT/PTO

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1

WIPER BLADE FOR CLEANING GLASS SURFACES ON VEHICLES,  
ESPECIALLY MOTOR VEHICLES

BACKGROUND

The invention relates to a wiper blade in accordance with primary patent claim for cleaning glass surfaces

Wiper blades for cleaning glass surfaces on vehicles are known in highly varied configurations. Among them the so-called flat wiper blades are particularly known; they consist basically of a wiper blade body manufactured from a flexible rubber material and of support splines or spring splines engaging in lateral longitudinal grooves in the wiper blade body, which are then attached at both ends of the wiper blade body along with it to the wiper blade by means of end caps [DE-A-197 39 256] see DE-A-197 39 256

It is also known in the case of windshield wipers for the wiper blade body to be configured as an airfoil on its upper side facing away from the lip and thus from the glass surface to be cleaned, that is to say, with an inclined surface whose plane in the particular application includes an angle smaller than 90° with the plane of the glass surface, or with a correspondingly concave curved incline [DE-A 197 34 843] see DE-A-197 34 843

It is additionally known for wiper blades to provide a distribution passage inside the wiper blade body extending in the longitudinal direction of the wiper blade for a cleaning or washing fluid, where discharge openings are provided at the end caps at both ends of the wiper blade to discharge the cleaning or washing fluid onto the glass surface.

One of the disadvantages of the known wiper blades of the type mentioned above at the beginning is that the protruding areas or parts of the spring or carrier splines form relatively sharp edges, with a substantial risk of injury. Furthermore, these protruding parts have an especially negative aerodynamic effect on the behavior of the wiper blade and consequently of the windshield wiper at high speeds.

The object of the invention is to demonstrate a wiper blade which avoids these disadvantages. To achieve this object a wiper blade is configured in accordance with patent claim 1.

## SUMMARY

The part of the width of the carrier spline or spring spline protruding from the wiper blade body is covered by the profiled cover or molding respectively, so that the risk of <sup>injury</sup> ~~injuries~~ no longer exists. The profiled cover can be given an aerodynamically optimal form, especially on its exposed surfaces, so that even at high speed the result is optimal characteristics for the wiper blade furnished with at least one profiled cover.

In the case of the invention, a profiled cover of this type is provided at least on the forward side of the wiper blade <sup>^</sup> facing the direction of travel. The profiled cover can be manufactured in especially advantageous fashion from plastic, for example, <sup>and</sup> also from softer or flexible plastic, in particular, for example, as an extruded profile which is then cut to the required length in each case.

In the case of one <sup>aspect</sup> ~~embodiment~~ of the invention, the front profiled cover, with respect to the direction of travel in this particular application, is configured as an airfoil on at least one partial surface, which also contributes to an improvement in the behavior of the wiper blade at high speeds.

Furthermore the potential exists of providing in at least one profiled cover at least one distribution passage with at least one discharge opening or nozzle orifice for a cleaning or washing fluid.

## BRIEF DESCRIPTION OF THE DRAWING

[Further developments of the invention are the object of the subclaims.]

The invention is explained below in greater detail from embodiments using the <sup>figures</sup> ~~figures~~ drawing in which:

Figure 1 shows in a simplified rendering a section through a wiper blade of a windshield wiper which is otherwise not shown; <sup>CROSS</sup>

Figure 2 shows a partial <sup>side elevational view</sup> ~~drawing~~ of the windshield wiper in a side view; <sup>and</sup>

Figure 3 shows in a simplified partial rendering a section through a wiper blade of a further possible <sup>aspect</sup> ~~embodiment~~ of the invention. <sup>CROSS</sup>

## DETAILED DESCRIPTION

The wiper blade 1 shown in Figures 1 and 2 consists of a basically familiar wiper blade body 2 which is manufactured as an airfoil from a flexible rubber material, and from two ribbon-shaped support or spring splines 3 holding the wiper blade body 2 <sup>therebetween</sup> ~~between them~~, which are manufactured from a flexible material,

preferably from spring steel and which, like the wiper blade body 2, extend along the entire length of the wiper blade 1, which in the drawing selected for Figure 1 runs perpendicular to the drawing plane of the figure.

The cross-section of the wiper blade body 2 forms a section profile 4 with an underside 5 furnished by means of a flexible hinge 6 with the similarly formed-on lip 7, with which in the particular application the wiper blade 1 lies against the vehicle glass surface to be cleaned. A flexible Flexible hinge 6 and lip 7 similarly extend along the entire length of the wiper blade body 2. In the embodiment shown the flexible hinge 6 is formed approximately in the middle of the underside 5, specifically in center plane M which includes the longitudinal axis L of the wiper blade 1. The section profile 4 is furnished with a longitudinal groove on two longitudinal sides 8 and 9 which lie in planes perpendicular to the underside 5 in the embodiment shown. The grooves ~~former~~ are open on the longitudinal sides 8 and 9 as well as on the two ends of the wiper blade body 2 and lie in a common plane parallel to the underside 5.

A spring spline 3 is located in each longitudinal groove 10 with one part of its width, with the other part of its width, that is, in the case of the aspect embodiment shown about one half of its width, it protrudes out of the longitudinal groove 10 above the respective longitudinal side 8 or 9. In the middle of the wiper blade 1, the spring spline 3 wiper blade body 2 ~~it is attached to the wiper arm of the windshield wiper, which is not shown,~~ by means of an adapter, that is likewise not shown, which also grips the spring splines 3. Further, end caps 11 are attached at both ends of the wiper blade, which connect the ends of the spring splines 3 there to each other as well as to the wiper blade body 2.

As Figure 1 also shows, the section profile 4 on the upper side of the wiper blade facing away from the lip 7 is configured as an airfoil, that is, one longitudinal side 9 is of a greater height than the other longitudinal side 8, the result being a sloping airfoil surface on the upper side of the wiper blade body 2 forming a concave curve around axes parallel to the longitudinal extent or longitudinal axis L of the wiper blade body 2.

On the protruding sections of the support or spring spline 3 projecting above the longitudinal sides 8 and 9, profiled covers 13, 14 respectively are mounted, which in the <sup>aspect</sup>embodiment shown cover these projecting areas of the support splines 3 over their entire length, that is, <sup>extend</sup>right up to the two end caps 11. The profiled covers 13 and 14, which are preferably manufactured from plastic, wrap around the protruding areas of the carrier or spring splines 3 like claws, so that these areas are completely covered. For this purpose, the profiled covers 13 and 14 each have a longitudinal groove 15, 16, respectively, that is open to one longitudinal side of the respective profiled cover, <sup>the</sup>13 or 14 as well as at the two ends of this airfoil, and in which is located the respective protruding part of the spring spline 3.

In the longitudinal grooves, 15 and 16 respectively, catches are provided which in the embodiment shown are formed by projections 17, which act in conjunction with mating notches on the support or spring spline 3. In the <sup>aspect</sup>embodiment shown, these mating notches are formed by openings 18, which the support or spring splines 3 have at least on the partial area protruding beyond the wiper blade body 2. With the projections 17 engaging in the openings 18, the profiled covers 13 and 14 are retained by latching onto the wiper blade 1. In the <sup>aspect</sup>embodiment shown, the profiled cover 13 adjacent to the longitudinal side 8 is shaped in such a way that it forms an additional airfoil on its outside facing away from the wiper blade body 2, with airfoil surface 19 also forming a concave curve around axes running parallel to the longitudinal axis L, where in the cross-sectional drawing of Figure 1 a convex curved surface 20 adjoins the airfoil surface 19 and then changes into airfoil surface 20 by way of another surface 21.

As Figure 1 also shows, the surface 21 forms an extension of airfoil surface 12, so that on the one hand the airfoil surface 12 is enlarged and on the other hand an additional airfoil, or rather an additional airfoil surface 19, is created by the profiled cover 13. The airfoil surface 19 is formed at least partially on a projection 13' of the profiled cover 13, which <sup>projection 13'</sup>(projection) extends beyond the underside 5 of the section profile 4.

In the <sup>aspect</sup>embodiment shown, a passage 22, 23 respectively is provided in each profiled cover 13, 14, which extends in the longitudinal direction of the profiled

cover 13, 14, respectively. The passages 22, 23 serve on the one hand to reduce the weight of the particular profiled cover. The passages 22 and 23 serve further specifically to distribute and deposit a cleaning or washing fluid on the vehicle glass to be cleaned. To do this, nozzle orifices 24, 25 respectively are provided on the profiled covers 13 and 14 opening into the particular passage 22, 23 respectively, specifically on the underside of the profiled cover facing the vehicle windshield or the lip 7, respectively, such that the nozzle orifices 24, 25 respectively form an acute angle, that is, an angle smaller than  $90^\circ$ , with the center plane M with their axis, and are located radially or roughly radially to the longitudinal extent of the specific passage 22, 23 respectively. The nozzle orifices 24 are arranged to be covered or protected from the slipstream by the projection 13'. To supply the cleaning agent, an end cap 11 is configured as a connector with an internal passage which connects to the passages 22 and 23 as well to a source for the fluid cleaning agent (water, ~~or~~ preferably water with cleaning and anti-freeze additives) by means of a hose 26. The other end cap 11 is then, for example, configured such that it closes off the two passages 22 and 23 at the appropriate end. As Figure 2 shows, as a result of the positioning of the passages 22 and 23, the corresponding discharge openings 24 and 25 are located at a relatively great distance from the center plane M and therefore from the lip 7, so the result is that the cleaning or wiper fluid deposited on the windshield has a long time to take effect.

Plastic or also a flexible rubber material, for example, flexible plastic <sup>aspect</sup> is suitable as material for the profiled covers 13, 14. In the embodiment shown, <sup>the</sup> profiled cover 13 is incorporated on the side of the wiper blade 1 which in the particular application forms the front side with reference to the direction of travel of the vehicle.

The cleaning or washing fluid can either be discharged simultaneously through the two passages 22 and 23 and the corresponding discharge openings 24 and 25, or the possibility also exists, with the windshield wipers switched on, of controlling the output depending on the direction of the wiper blade's motion in such a way that the output of cleaning or washing fluid always takes place through passage

22 or 23 respectively, or rather those discharge openings 24 and 25 which are moving ahead of the lip 7 with respect to the motion of the wiper blade 1.

Figure 3 shows as a further possible embodiment <sup>aspect of the invention</sup> a wiper blade 1a of which for the sake of simpler presentation only the spring spline 3 located on the right of the center plane M is shown together with a profiled cover 14a, which corresponds to the profiled cover 14 of the wiper blade 1, although it has a shape differing somewhat from profiled cover 14. Otherwise the wiper blade 1a is configured in the same way, particularly with respect to the wiper blade body 2, the support spline 3 and the profiled cover 13, as was described previously for the wiper blade 1.

As shown, in the area of its outer side 27, which forms the particular longitudinal side of the wiper blade and faces away from the wiper blade body 2, the profiled cover 14a is furnished with a strip-like face 14a' which in a similar way to the projection 13' of the profiled cover 13 extends with its open edge clearly beyond the underside of the remaining part of the profiled cover 14a facing the lip 7, and specifically, for example, as far as a plane E which is perpendicular to the center plane M, intersects the lip 7 below the flexible hinge 6, and on which or in the vicinity of which, for example, the open edge of the projection 13' is located. In the aspect embodiment shown, the outside of the face 14a' away from the lip 7 forms the continuation of the outside 27. The face 14a' extends over the entire length of the profiled cover 14a or over the entire or almost the entire length of the wiper blade 1a.

The profiled cover 14a once again has the passage 23 with the nozzle orifices 25, which however in this aspect embodiment include an angle with the center plane M which is larger, compared with the corresponding angle of the nozzle orifices 25 for wiper blade 1.

As a result of the face 14a', there is a particularly favorable change in the airflow (among other things) such that specifically at the upper reversing point of the motion of the wiper blade, that is, in the vicinity of a vehicle's A-pillar during the inwipe stroke, or the downward motion, in which the longitudinal side of the wiper blade 1a with the face 14a' is trailing, the water which was wiped off the vehicle

windshield by the wiper blade during its upward motion, is prevented from running after the wiper blade 1a and thereby impairing vision.

Reference Numeral List

1	Wiper blade
2	Wiper blade body
3	Support or spring spline
4	Section profile
5	Underside of the section profile
6	Flexible hinge
7	Lip
8, 9	Wiper blade body longitudinal side
10	Longitudinal groove
11	End cap
12	Airfoil surface
13, 14, 14a	Profiled cover
13'	Projection
14a'	Face
15, 16	Longitudinal groove
17	Projection
18	Space
19	Additional airfoil surface
20, 21	Surface section
22, 23	Passage
24, 25	Nozzle orifice
26	Connecting hose
27	Longitudinal side
L	Longitudinal axis
M	Center plane
E	Plane



What is claimed is:

{What Is Claimed Is:}

1. Wiper blade for cleaning glass surfaces on vehicles, specifically motor vehicles, having an elongated wiper blade body (2) which consists of a flexible rubber material and can be laid against the particular glass surface, furnished on both longitudinal sides with longitudinal grooves (10) situated opposite each other, in which a preferably springy support spline (3) extending in the longitudinal direction L of the wiper blade body (2) engages with part of its width, where each support spline (3) protrudes beyond the longitudinal side in question (8, 9) with a further part of its width, characterized in that a profiled cover covering this support spline is mounted and attached to the protruding part of at least one of the support splines (3).
2. Wiper blade in accordance with claim 1, wherein at least one profiled cover (13) is provided on a front side of the wiper blade (1, 1a), with respect to the direction of travel of a vehicle.
3. Wiper blade in accordance with claim 1 or 2, wherein a profiled cover (13, 14, 14a) is mounted in each case on the projecting parts of both support splines (10).
4. Wiper blade in accordance with one of the preceding claims, wherein the profiled cover (13, 14, 14a) covers the projecting parts of each of the support splines (3) along its entire length.
5. Wiper blade in accordance with one of the preceding claims, wherein at least one profiled cover (13, 14, 14a) fits closely against the adjacent longitudinal side (8, 9) of the wiper blade body (2).

6. Wiper blade in accordance with one of the preceding claims, wherein at least one profiled cover (13) is retained on the appropriate support spline (3) by catches (17, 18).

7. Wiper blade in accordance with one of the preceding claims, wherein the at least one profiled cover (13, 14, 14a) has a longitudinal groove (15, 16) with which it is mounted on the projecting part of at least one support spline (3), gripping it like a claw.

8. Wiper blade in accordance with claim 7, wherein at least one projection (17) is provided in the longitudinal groove (15, 16), which acts in conjunction with a mating notch (18) on the specific support spline (3).

9. Wiper blade in accordance with one of the preceding claims, wherein at least one passage (22, 23) extending in the longitudinal direction of the wiper blade (L) is provided in at least one profiled cover (13, 14, 14a) for a cleaning or washing fluid, and wherein at least one nozzle orifice (24, 25) opens into the passage (22, 23) to discharge the cleaning or washing fluid onto a glass surface.

10. Wiper blade in accordance with one of the preceding claims, wherein characterized by at least one connection (11) to connect the passage (22, 23) to a source for the cleaning or washing fluid.

11. Wiper blade in accordance with one of the preceding claims, wherein at least one profiled cover (13, 14a) has a strip-like projection (13') or a strip-like face (14a') which extends beyond the underside of the remaining part of the profiled cover (13, 14a).

12. Wiper blade in accordance with one of the preceding claims, wherein at least one profiled cover (13), preferably the profiled cover (13) on the front side of the wiper blade (1, 1a) with respect to the direction of travel of a

vehicle, is configured as an airfoil on an outer surface extending in the longitudinal direction of the wiper blade (L), or is furnished with a primary airfoil surface (19).

13. Wiper blade in accordance with claim 12, wherein at least one profiled cover (13) is equipped on its projection (13') with a primary airfoil surface (19).

14. Wiper blade in accordance with one of the preceding claims, wherein the wiper blade body (2) is configured on one upper side as an airfoil or is equipped with a second airfoil surface.

15. Wiper blade in accordance with one of the preceding claims, wherein at least one profiled cover (13) has a surface (21) which adjoins the second airfoil surface and thus effectively increases the width of the second airfoil surface (12).

16. Wiper blade in accordance with one of the preceding claims, wherein at least one profiled cover (13, 14, 14a) is manufactured from plastic.

17. Wiper blade in accordance with one of the preceding claims, wherein at least one profiled cover (13, 14, 14a) is manufactured from a flexible material.

12  
ABSTRACT  
{Abstract}

In the case of a wiper blade (1) for cleaning glass surfaces on vehicles, and having an elongated wiper blade body (2) which consists of a flexible rubber material and can be placed against the glass and is furnished on both its longitudinal sides with longitudinal grooves (15, 16) situated opposite to each other, in which a support or spring spline (3) extending in the longitudinal direction of the wiper strip engages with part of its width, a profiled cover (13, 14) is mounted on and attached to the part of at least one support spline (3) projecting beyond the wiper blade body, covering this support spline.

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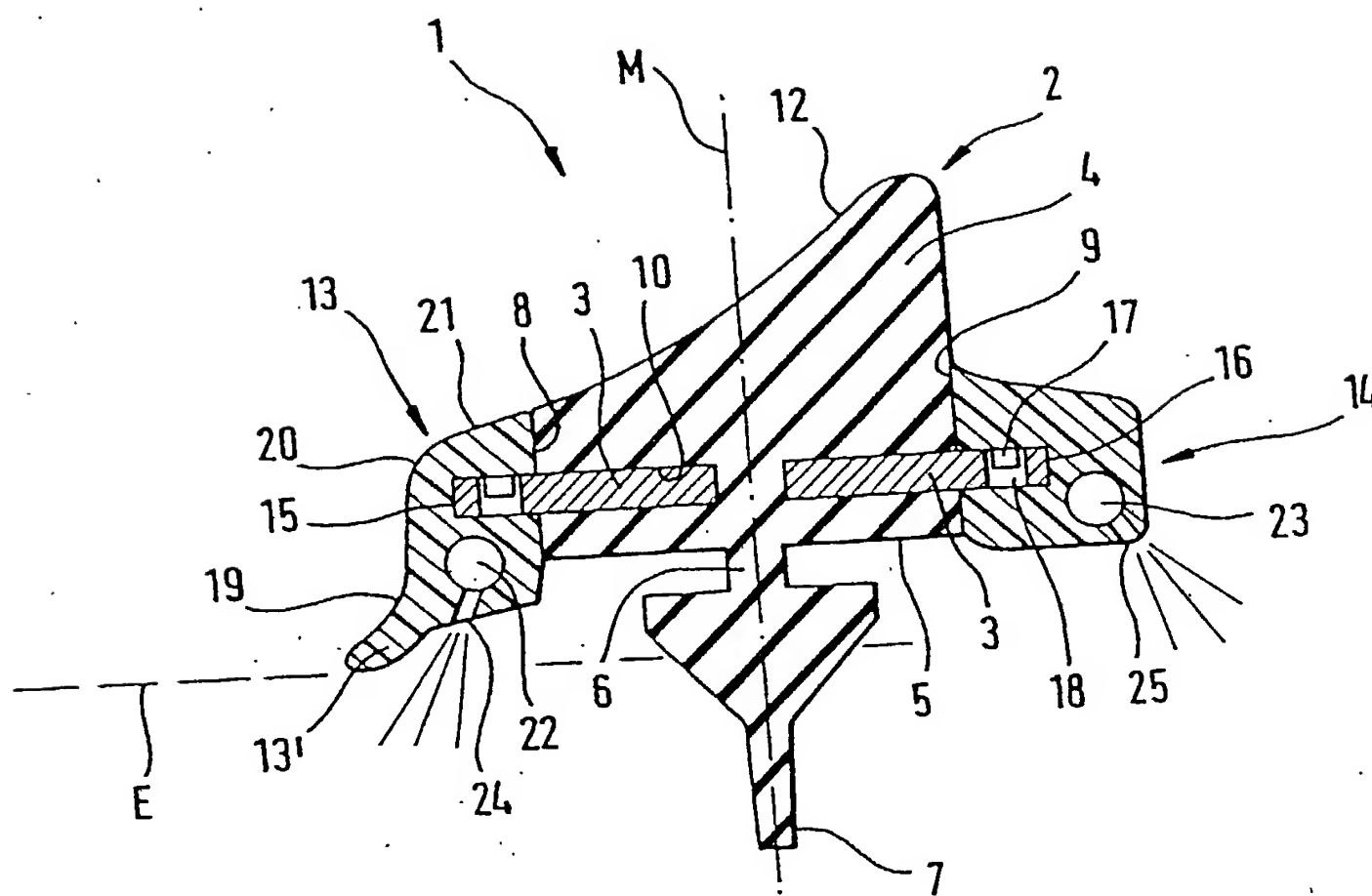
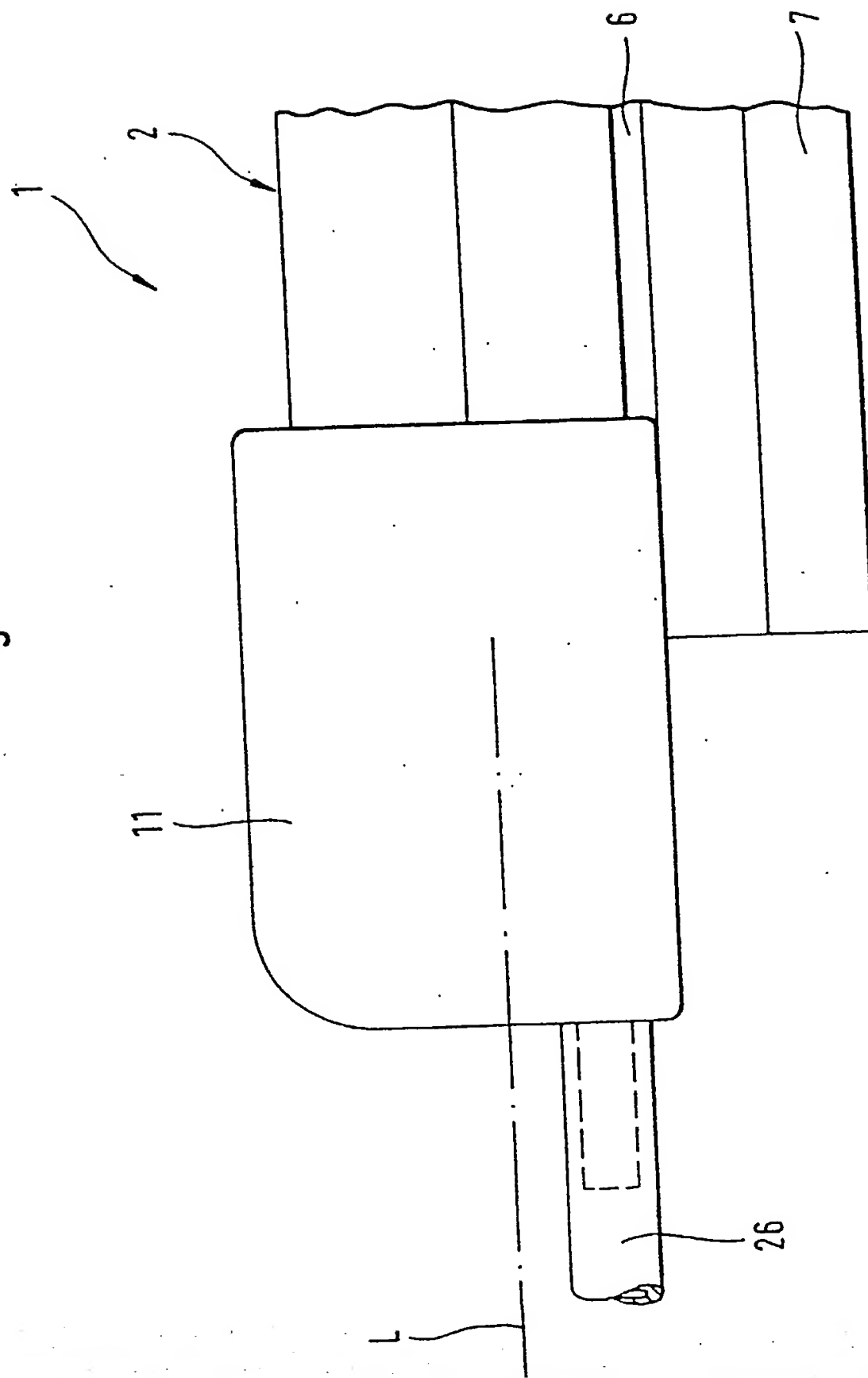


Fig. 1

2 / 3

Fig. 2



3 / 3

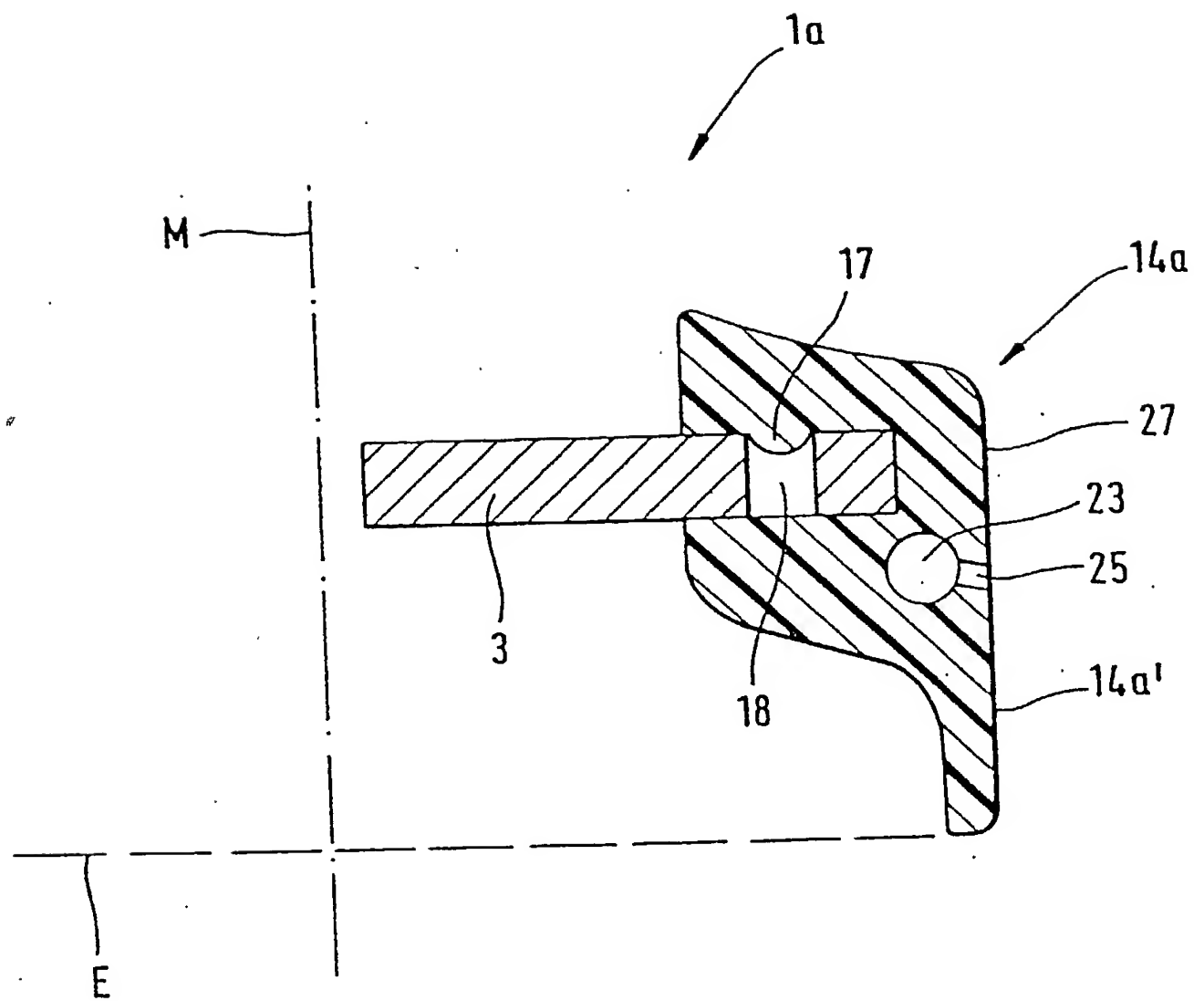


Fig. 3



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## SUBSTITUTE SPECIFICATION

Our Reference: VWP 9607 (VWP-512-A)

PATENT

### **WIPER BLADE FOR CLEANING GLASS SURFACES ON VEHICLES, ESPECIALLY MOTOR VEHICLES**

#### BACKGROUND

- [0001] The invention relates to a wiper blade for cleaning glass surfaces.
- [0002] Wiper blades for cleaning glass surfaces on vehicles are known in highly varied configurations. Among them the so-called flat wiper blades are particularly known; they consist basically of a wiper blade body manufactured from a flexible rubber material and of support splines or spring splines engaging in lateral longitudinal grooves in the wiper blade body, which are then attached at both ends of the wiper blade body along with it to the wiper blade by means of end caps, see DE-A-197 39 256.
- [0003] It is also known in the case of windshield wipers for the wiper blade body to be configured as an airfoil on its upper side facing away from the lip and thus from the glass surface to be cleaned, that is to say, with an inclined surface whose plane in the particular application includes an angle smaller than  $90^\circ$  with the plane of the glass surface, or with a correspondingly concave curved incline, see DE-A-197 34 843.
- [0004] It is additionally known for wiper blades to provide a distribution passage inside the wiper blade body extending in the longitudinal direction of the wiper blade for a cleaning or washing fluid, where discharge openings are provided at the end caps at both ends of the wiper blade to discharge the cleaning or washing fluid onto the glass surface.
- [0005] One of the disadvantages of the known wiper blades of the type mentioned above is that the protruding areas or parts of the spring or carrier splines form relatively sharp edges, with a substantial risk of injury. Furthermore, these protruding parts have an especially negative aerodynamic effect on the behavior of the wiper blade and consequently of the windshield wiper at high speeds.



[0006] The object of the invention is to demonstrate a wiper blade which avoids these disadvantages.

### SUMMARY

[0007] The part of the width of the carrier spline or spring spline protruding from the wiper blade body is covered by the profiled cover or molding, respectively, so that the risk of injury no longer exists. The profiled cover can be given an aerodynamically optimal form, especially on its exposed surfaces, so that even at high speed the result is optimal characteristics for the wiper blade furnished with at least one profiled cover.

[0008] In the case of the invention, a profiled cover of this type is provided at least on the forward side of the wiper blade facing the direction of travel. The profiled cover can be manufactured in especially advantageous fashion from plastic, for example, and also from softer or flexible plastic, in particular, for example, as an extruded profile which is then cut to the required length in each case.

[0009] In the case of one aspect of the invention, the front profiled cover, with respect to the direction of travel in this particular application, is configured as an airfoil on at least one partial surface, which also contributes to an improvement in the behavior of the wiper blade at high speeds.

[0010] Furthermore the potential exists of providing in at least one profiled cover at least one distribution passage with at least one discharge opening or nozzle orifice for a cleaning or washing fluid.

### BRIEF DESCRIPTION OF THE DRAWING

[0011] The invention is explained below in greater detail from embodiments using the drawing in which:

[0012] Figure 1 shows in a simplified rendering a cross section through a wiper blade of a windshield wiper which is otherwise not shown;

[0013] Figure 2 shows a partial side elevational view of the windshield wiper and;

[0014] Figure 3 shows in a simplified partial rendering a cross section through a wiper blade of a further possible aspect of the invention.

### DETAILED DESCRIPTION

[0015] The wiper blade 1 shown in Figures 1 and 2 consists of a basically familiar wiper blade body 2 which is manufactured as an airfoil from a flexible rubber material, and from two ribbon-shaped support or spring splines 3 holding the wiper blade body 2 therebetween, which are manufactured from a flexible material, preferably from spring steel and which, like the wiper blade body 2, extend along the entire length of the wiper blade 1, which in Figure 1 runs perpendicular to the drawing plane.

[0016] The cross-section of the wiper blade body 2 forms a section profile 4 with an underside 5 furnished by means of a flexible hinge 6 with the similarly formed-on lip 7, with which in the particular application the wiper blade 1 lies against the vehicle glass surface to be cleaned. A flexible hinge 6 and a lip 7 similarly extend along the entire length of the wiper blade body 2. In the embodiment shown the flexible hinge 6 is formed approximately in the middle of the underside 5, specifically in center plane M which includes the longitudinal axis L of the wiper blade 1. The section profile 4 is furnished with a longitudinal groove on two longitudinal sides 8 and 9 which lie in planes perpendicular to the underside 5 in the embodiment shown. The grooves are open on the longitudinal sides 8 and 9 as well as on the two ends of the wiper blade body 2 and lie in a common plane parallel to the underside 5.

[0017] A spring spline 3 is located in each longitudinal groove 10 with one part of its width, with the other part of its width, that is, in the case of the aspect shown about one half of its width, protrudes out of the longitudinal groove 10 above the respective longitudinal side, 8 or 9. In the middle of the wiper blade 1, the wiper blade body 2 is attached to the wiper arm of the windshield wiper, which is not shown, by means of an adapter, that is likewise not shown, which also grips the spring splines 3. Further, end caps 11 are attached at both ends of the wiper blade, which connect the ends of the spring splines 3 to each other as well as to the wiper blade body 2.

[0018] As Figure 1 also shows, the section profile 4 on the upper side of the wiper blade facing away from the lip 7 is configured as an airfoil, that is, one longitudinal side 9 is of a greater height than the other longitudinal side 8, the result

being a sloping airfoil surface on the upper side of the wiper blade body 2 forming a concave curve around axes parallel to the longitudinal extent or longitudinal axis L of the wiper blade body 2.

[0019] On the protruding sections of the support or spring spline 3 projecting above the longitudinal sides 8 and 9, profiled covers 13, 14 respectively are mounted, which in the aspect shown cover these projecting areas of the support splines 3 over their entire length, that is, right up to the two end caps 11. The profiled covers 13 and 14, which are preferably manufactured from plastic, wrap around the protruding areas of the carrier or spring splines 3 like claws, so that these areas are completely covered. For this purpose, the profiled covers 13 and 14 each have a longitudinal groove 15, 16, respectively, that is open to one longitudinal side of the respective profiled cover 13 or 14 as well as at the two ends of the airfoil, and in which is located the respective protruding part of the spring spline 3.

[0020] In the longitudinal grooves 15 and 16 respectively, catches are provided which in the embodiment shown are formed by projections 17, which act in conjunction with mating notches on the support or spring spline 3. In the aspect shown, these mating notches are formed by openings 18, which the support or spring splines 3 have at least on the partial area protruding beyond the wiper blade body 2. With the projections 17 engaging in the openings 18, the profiled covers 13 and 14 are retained by latching onto the wiper blade 1. In the aspect shown, the profiled cover 13 adjacent to the longitudinal side 8 is shaped in such a way that it forms an additional airfoil on its outside facing away from the wiper blade body 2, with airfoil surface 19 also forming a concave curve around axes running parallel to the longitudinal axis L, where in the cross-sectional drawing of Figure 1 a convex curved surface 20 adjoins the airfoil surface 19 and then changes into airfoil surface 20 by way of another surface 21.

[0021] As Figure 1 also shows, the surface 21 forms an extension of airfoil surface 12, so that on the one hand the airfoil surface 12 is enlarged and, on the other hand, an additional airfoil, or rather an additional airfoil surface 19, is created by the profiled cover 13. The airfoil surface 19 is formed at least partially on a projection

13' of the profiled cover 13, which projection 13' extends beyond the underside 5 of the section profile 4.

[0022] In the aspect shown, a passage 22, 23 respectively is provided in each profiled cover 13, 14, which extends in the longitudinal direction of the profiled cover 13, 14, respectively. The passages 22, 23 serve on the one hand to reduce the weight of the particular profiled cover. The passages 22 and 23 serve further specifically to distribute and deposit a cleaning or washing fluid on the vehicle glass to be cleaned. To do this, nozzle orifices 24, 25 respectively are provided on the profiled covers 13 and 14 opening into the particular passage 22, 23 respectively, specifically on the underside of the profiled cover facing the vehicle windshield or the lip 7, respectively, such that the nozzle orifices 24, 25 respectively form an acute angle, that is, an angle smaller than  $90^\circ$ , with the center plane M with their axis, and are located radially or roughly radially to the longitudinal extent of the specific passage 22, 23 respectively. The nozzle orifices 24 are arranged to be covered or protected from the slipstream by the projection 13'. To supply the cleaning agent, an end cap 11 is configured as a connector with an internal passage which connects to the passages 22 and 23 as well to a source for the fluid cleaning agent (water, or preferably water with cleaning and anti-freeze additives) by means of a hose 26. The other end cap 11 is then, for example, configured such that it closes off the two passages 22 and 23 at the appropriate end. As Figure 2 shows, as a result of the positioning of the passages 22 and 23, the corresponding discharge openings 24 and 25 are located at a relatively great distance from the center plane M and therefore from the lip 7, so the result is that the cleaning or wiper fluid deposited on the windshield has a long time to take effect.

[0023] Plastic or also a flexible rubber material, for example, flexible plastic is suitable as material for the profiled covers 13, 14. In the aspect shown, profiled cover 13 is incorporated on the side of the wiper blade 1 which in the particular application forms the front side with reference to the direction of travel of the vehicle.

[0024] The cleaning or washing fluid can either be discharged simultaneously through the two passages 22 and 23 and the corresponding discharge openings 24 and

25, or the possibility also exists, with the windshield wipers switched on, of controlling the output depending on the direction of the wiper blade's motion in such a way that the output of cleaning or washing fluid always takes place through passage 22 or 23 respectively, or rather those discharge openings 24 and 25 which are moving ahead of the lip 7 with respect to the motion of the wiper blade 1.

[0025] Figure 3 shows as a further possible aspect of the invention, a wiper blade 1a of which for the sake of simpler presentation only the spring spline 3 located on the right of the center plane M is shown together with a profiled cover 14a, which corresponds to the profiled cover 14 of the wiper blade 1, although it has a shape differing somewhat from profiled cover 14. Otherwise the wiper blade 1a is configured in the same way, particularly with respect to the wiper blade body 2, the support spline 3 and the profiled cover 13, as was described previously for the wiper blade 1.

[0026] As shown, in the area of its outer side 27, which forms the particular longitudinal side of the wiper blade and faces away from the wiper blade body 2, the profiled cover 14a is furnished with a strip-like face 14a' which in a similar way to the projection 13' of the profiled cover 13 extends with its open edge clearly beyond the underside of the remaining part of the profiled cover 14a facing the lip 7, and specifically, for example, as far as a plane E which is perpendicular to the center plane M, intersects the lip 7 below the flexible hinge 6, and on which or in the vicinity of which, for example, the open edge of the projection 13' is located. In the aspect shown, the outside of the face 14a' away from the lip 7 forms the continuation of the outside 27. The face 14a' extends over the entire length of the profiled cover 14a or over the entire or almost the entire length of the wiper blade 1a.

The profiled cover 14a once again has the passage 23 with the nozzle orifices 25, which, however, in this aspect include an angle with the center plane M which is larger, compared with the corresponding angle of the nozzle orifices 25 for wiper blade 1.

[0027] As a result of the face 14a', there is a particularly favorable change in the airflow (among other things) such that specifically at the upper reversing point of the motion of the wiper blade, that is, in the vicinity of a vehicle's A-pillar during the

in wipe stroke, or the downward motion, in which the longitudinal side of the wiper blade 1a with the face 14a' is trailing, the water which was wiped off the vehicle windshield by the wiper blade during its upward motion, is prevented from running after the wiper blade 1a and thereby impairing vision.

What is claimed is:

1                   1.       Wiper blade for cleaning glass surfaces on vehicles, specifically  
2 motor vehicles, having an elongated wiper blade body (2) which consists of a flexible  
3 rubber material and can be laid against the particular glass surface, furnished on both  
4 longitudinal sides with longitudinal grooves (10) situated opposite each other, in  
5 which a preferably springy support spline (3) extending in the longitudinal direction  
6 L of the wiper blade body (2) engages with part of its width, where each support  
7 spline (3) protrudes beyond the longitudinal side in question (8, 9) with a further part  
8 of its width, characterized in that a profiled cover covering this support spline is  
9 mounted and attached to the protruding part of at least one of the support splines (3).

1                   2.       Wiper blade in accordance with claim 1, wherein at least one  
2 profiled cover (13) is provided on a front side of the wiper blade (1, 1a), with respect  
3 to the direction of travel of a vehicle.

1                   3.       Wiper blade in accordance with claim 1 or 2, wherein a profiled  
2 cover (13, 14, 14a) is mounted in each case on the projecting parts of both support  
3 splines (10).

1                   4.       Wiper blade in accordance with one of the preceding claims,  
2 wherein the profiled cover (13, 14, 14a) covers the projecting parts of each of the  
3 support splines (3) along its entire length.

1                   5.       Wiper blade in accordance with one of the preceding claims,  
2 wherein at least one profiled cover (13, 14, 14a) fits closely against the adjacent  
3 longitudinal side (8, 9) of the wiper blade body (2).

1                   6.       Wiper blade in accordance with one of the preceding claims,  
2 wherein at least one profiled cover (13) is retained on the appropriate support spline  
3 (3) by catches (17, 18).  
4

1                   7.       Wiper blade in accordance with one of the preceding claims,  
2       wherein the at least one profiled cover (13, 14, 14a) has a longitudinal groove (15,  
3       16) with which it is mounted on the projecting part of at least one support spline (3),  
4       gripping it like a claw.

1                   8.       Wiper blade in accordance with claim 7, wherein at least one  
2       projection (17) is provided in the longitudinal groove (15, 16), which acts in  
3       conjunction with a mating notch (18) on the specific support spline (3).

1                   9.       Wiper blade in accordance with one of the preceding claims,  
2       wherein at least one passage (22, 23) extending in the longitudinal direction of the  
3       wiper blade (L) is provided in at least one profiled cover (13, 14, 14a) for a cleaning  
4       or washing fluid, and wherein at least one nozzle orifice (24, 25) opens into the  
5       passage (22, 23) to discharge the cleaning or washing fluid onto a glass surface.

1                   10.      Wiper blade in accordance with one of the preceding claims,  
2       wherein characterized by at least one connection (11) to connect the passage (22, 23)  
3       to a source for the cleaning or washing fluid.

1                   11.      Wiper blade in accordance with one of the preceding claims,  
2       wherein at least one profiled cover (13, 14a) has a strip-like projection (13') or a  
3       strip-like face (14a') which extends beyond the underside of the remaining part of the  
4       profiled cover (13, 14a).

1                   12.      Wiper blade in accordance with one of the preceding claims,  
2       wherein at least one profiled cover (13), preferably the profiled cover (13) on the  
3       front side of the wiper blade (1, 1a) with respect to the direction of travel of a  
4       vehicle, is configured as an airfoil on an outer surface extending in the longitudinal  
5       direction of the wiper blade (L), or is furnished with a primary airfoil surface (19).



1                   13.     Wiper blade in accordance with claim 12, wherein at least one  
2     profiled cover (13) is equipped on its projection (13') with a primary airfoil surface  
3     (19).

1                   14.     Wiper blade in accordance with one of the preceding claims,  
2     wherein the wiper blade body (2) is configured on one upper side as an airfoil or is  
3     equipped with a second airfoil surface.

1                   15.     Wiper blade in accordance with one of the preceding claims,  
2     wherein at least one profiled cover (13) has a surface (21) which adjoins the second  
3     airfoil surface and thus effectively increases the width of the second airfoil surface  
4     (12).

1                   16.     Wiper blade in accordance with one of the preceding claims,  
2     wherein at least one profiled cover (13, 14, 14a) is manufactured from plastic.

1                   17.     Wiper blade in accordance with one of the preceding claims,  
2     wherein at least one profiled cover (13, 14, 14a) is manufactured from a flexible  
3     material.

ABSTRACT

[0028] In the case of a wiper blade for cleaning glass surfaces on vehicles, and having an elongated wiper blade body which consists of a flexible rubber material and can be placed against the glass and is furnished on both its longitudinal sides with longitudinal grooves situated opposite to each other, in which a support or spring spline extending in the longitudinal direction of the wiper strip engages with part of its width, a profiled cover is mounted on and attached to the part of at least one support spline projecting beyond the wiper blade body covering this support spline.

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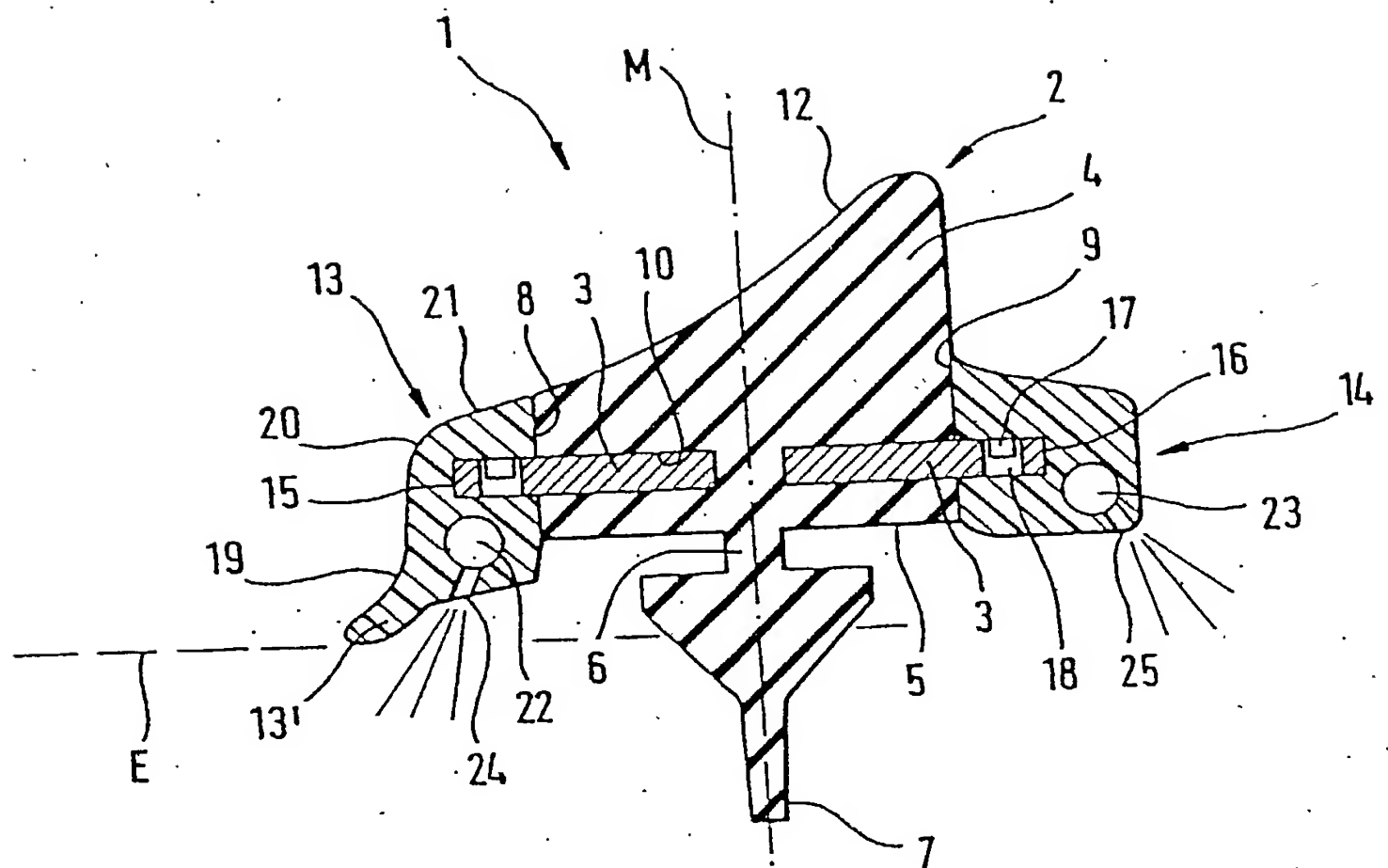


Fig. 1

Fig. 2

